

AMENDMENTS TO THE DRAWINGS

Please amend Figure 1 as shown in the enclosed replacement sheet. The attached sheet of formal drawings includes changes to Figure 1 to indicate that Figure 1 is Prior Art.

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 1-13 were pending in this application. By way of this reply, claim 3 has been cancelled without prejudice or disclaimer. Accordingly, claims 1, 2, and 4-13 are now pending in this application. Of these claims, claims 10-13 are withdrawn from consideration. Claims 1 and 10 are independent. The remaining claims depend, directly or indirectly, from claim 1 or 10.

Claim Amendments

Independent claim 1 has been amended by way of this reply to clarify the claimed invention. Specifically, claim 1 has been amended to require applying a voltage pulse for a predetermined time to electrodes in an ion chamber, measuring an ion current signal related to ion currents induced by the voltage pulse while the voltage pulse is being applied to the electrodes, measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped, and determining a magnitude of the high-energy radiation flux dependent on the ion current signal and the leakage current signal. Further, claim 1 has been amended to correct minor informalties. No new subject matter has been added by way of these amendments, as support for these amendments may be found, for example, in paragraphs [0027]-[0029] of the Specification as filed.

Further, claims 4 and 8 have been amended to require determining a gain of an amplifier of the ion current signal and the leakage current signal, and claim 8 has been amended

to require that the magnitude of the high-energy radiation flux is proportional to the ion current signal and the gain of the amplifier. Further, claims 5 and 9 have been amended to require applying a ramping voltage to the electrodes. Additionally, claim 6 has been amended to require that one of a magnitude of the ion current signal and a magnitude of the leakage current signal is adjusted dependent on the gain of the amplifier, and claim 7 has been amended to require that subtracting the leakage current signal from the ion current signal is dependent on one of a magnitude-adjusted ion current signal and a magnitude-adjusted leakage current signal. No new subject matter has been added by way of these amendments, as support for these amendments may be found, for example, in paragraph [0020] and in paragraphs [0027]-[0029] of the Specification as filed. Further, claims 2 and 4-9 have been amended to correct minor errors and to correspond to amendments made to claims from which they depend. No new matter has been added by way of these amendments.

Objection(s)

Drawings

Figure 1 is objected to as the Examiner asserts that Figure 1 should be designated by a legend such as "Prior Art." By way of this reply, Figure 1 has been amended to indicate that Figure 1 is Prior Art. Accordingly, withdrawal of this rejection is respectfully requested.

Additionally, the Examiner asserts that Voltage Pulse Circuitry is essentially a black box with no description of the internals thereof. Applicant respectfully notes that paragraph [0026] of the Specification as filed states that the voltage pulse circuitry 33 may be any voltage pulse circuitry known in the art or yet to be developed, and can provide an ion transport drive voltage to the ion chamber for a selected duration (*i.e.*, a voltage pulse). Paragraph [0026] of the Specification as filed also states that the voltage pulse circuitry 33 may

be used to provide a ramping voltage (or other shaped voltage pulse) to the ion chamber. As amended, independent claim 1 requires “applying a voltage pulse for a predetermined time to electrodes in an ion chamber.” Amended claim 9 requires applying a ramping voltage to the electrodes.

Applicant respectfully asserts that pulse generators capable of such functions are known in the art, and, resultantly, no discussion of such pulse generators should be necessary. For example, Applicant notes that numerous “off-the-shelf” products exist that are capable of performing such functions. Accordingly, as such pulse generators are known in the art, withdrawal of the objection with respect to the Voltage Pulse Circuitry is respectfully requested.

Rejection(s) under 35 U.S.C. § 112

Claims 5 and 9

Claims 5 and 9 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner asserts that “it is not seen wherein the Specification sets forth exactly how and in what manner the gain is determined by merely applying a ramping current to the electrodes.” As amended, claims 5 and 9 require that determining the gain of the amplifier comprises applying a ramping voltage to the electrodes. To the extent that this rejection may still apply to amended claims 5 and 9, the rejection is respectfully traversed.

As discussed, for example, with reference to paragraph [0032] of the Specification, a small voltage ramp may be applied to the ion chamber. The output of the ion chamber (which is the input to the amplifier) is a measured and/or a known quantity, *i.e.*, the leakage current plus the calibration current applied to the ion chamber. The calculation of the gain of the amplifier is a simple calculation of the output of the amplifier output divided by the

input of the amplifier, which is a calculation known to one skilled in the art. Thus, Applicant respectfully asserts that determining the gain is disclosed in the Specification as filed. Accordingly, withdrawal of the rejection to claims 5 and 9 is respectfully requested.

Claims 3-9

Claims 3-9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claim 3 has been cancelled by way of this reply. Thus, this rejection is moot with respect to claim 3. Claims 4-9 have been amended as described above. To the extent that this rejection may still apply to amended claims 4-9, the rejections are respectfully traversed.

The Examiner has rejected claims 4 and 8 because the Examiner asserts that the claims fail to disclose exactly what gain is determined. Further, the Examiner asserts that the limitation “is based on” of claim 8 does not particularly point out and distinctly claim how and in what manner the magnitude of the high-energy radiation is determined. Amended claims 4 and 8 now require that a gain of an amplifier of the ion current signal and the leakage current signal is determined. Further, amended claim 8 now requires that the magnitude of the high-energy radiation flux is proportional to the ion current signal and the gain of the amplifier.

With respect to claims 4 and 8, the claim recites that a gain of an amplifier of the ion current signal and the leakage current signal is determined. Further, with respect to claim 8, it would be understood by one skilled in the art that that the magnitude of the high-energy radiation flux is determined dependent on the ion current signal and the gain of the amplifier. For example, as explained in paragraph [0020] of the Specification as filed, ion currents may be measured by electronics module 17. The magnitudes of the ion currents are directly proportional to the number of ions transferred to the electrodes, which is proportional to the thermal neutron flux. Accordingly, Applicant respectfully asserts that claims 4 and 8 are not vague, indefinite, or

incomplete, and withdrawal of the rejections with respect to claims 4 and 8 is respectfully requested.

Claims 5, 6, and 7 are rejected as the Examiner asserts that they are vague, indefinite, and incomplete as to what is meant by and encompassed by the limitation "gain." Additionally, the Examiner asserts that claims 6 and 7 fail to particularly point out and distinctly claim, respectively, how and in what manner the gain is used to adjust a magnitude of the ion current signal, and how and in what manner the magnitude-adjusted ion current signal is used. Claims 5, 6, and 7 have been amended as described above to clarify the invention. As amended, claims 5 and 6 now refer to the gain of the amplifier of the ion current signal and the leakage current signal, as required by amended independent claim 4. Further, claim 6 has been amended to require that one of a magnitude of the ion current signal and a magnitude of the leakage current signal is adjusted dependent on the gain of the amplifier, and claim 7 has been amended to require that subtracting the leakage current signal from the ion current signal is dependent on at least one of a magnitude-adjusted ion current signal and a magnitude-adjusted leakage current signal.

Thus, Applicant respectfully asserts that the term "gain" as used in the claims is not unclear. Further, Applicant respectfully asserts that it would be clear to one skilled in the art that one of a magnitude of the ion current signal and a magnitude of the leakage current signal is adjusted dependent on the gain of the amplifier, and at least one of the ion current signal and the leakage current signal are magnitude adjusted, as required by amended independent claims 6 and 7, respectively. Thus, Applicant respectfully asserts that as amended claims 5, 6, and 7 are not vague, indefinite, or incomplete. Accordingly, withdrawal of the rejections with respect to claims 5, 6, and 7 is respectfully requested.

Claim 9 is rejected by the Examiner as the Examiner asserts that the phrase “ramping current” is vague, indefinite, and incomplete. By way of this reply, claim 9 has been amended to require that determining the gain of the amplifier comprises applying a ramping voltage to the electrodes. As noted by the Examiner, paragraph [0032] of the Specification as filed states that in one or more embodiments of the invention, a voltage ramp or other characteristic non-CD pulse may be applied to the Ion chamber. Accordingly, Applicant respectfully asserts that as amended, claim 9 is not vague, indefinite, or incomplete, and withdrawal of the rejection with respect to claim 9 is respectfully requested.

Rejection(s) under 35 U.S.C. § 102

Claims 1, 2, 4, 6, and 8

Claims 1, 2, 4, 6, and 8 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,086,490 issued to Todt, Sr. (hereinafter “Todt”). Independent claim 1 has been amended in this reply to clarify the invention recited. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

One or more embodiments of the invention are directed to a method for measuring high-energy radiation. Amended independent claim 1 requires measuring an ion current signal related to ion currents induced by the voltage pulse while the voltage pulse is being applied to the electrodes, and measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped.

Todt does not disclose at least the above limitations of the claimed invention. In contrast to the claimed invention, Todt discloses a compensating current in the external CD circuit to negate effects of inherent alpha background noise. It would be clear to one skilled in

the art that Todt does not disclose measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped, as required by amended independent claim 1.

It would be clear to one skilled in the art that Todt is completely silent with respect to a leakage current as required by the claimed invention. As discussed, for example, in paragraph [0005] of the Specification as filed, leakage current is a current through the detector system that is not due to ion transport through the ion chamber 14. Leakage currents may be due to, for example, cables, connections, parasitic current in the components, moisture contamination of the amplifier circuit or other components. In contrast, Todt merely discloses compensating for an alpha background level in a commercial fission chamber (*see* Todt, col 2, line 59 – col. 3, line 19, col. 3, lines 36-45). Thus, it would be clear that Todt does not disclose measuring an ion current signal related to ion currents induced by the voltage pulse while the voltage pulse is being applied to the electrodes, and measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped, as required by the claimed invention.

In view of the above, Todt fails to show or suggest the invention as recited in amended independent claim 1. Thus, amended independent claim 1 is patentable over Todt. Claims 2 and 4-9, directly or indirectly dependent from claim 1, are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 1

Claim 1 is rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,319,066 issued to Gernert (hereinafter “Gernert”). Independent claim 1 has been amended in this reply to clarify the invention recited. To the extent that this rejection may still apply to amended claim 1, the rejection is respectfully traversed.

As discussed above, one or more embodiments of the invention are directed to a method for measuring high-energy radiation. Amended independent claim 1 requires measuring an ion current signal related to ion currents induced by the voltage pulse while the voltage pulse is being applied to the electrodes, and measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped.

Gernert, in contrast to the claimed invention, does not disclose measuring a leakage current as required by the claimed invention. Gernert teaches a radiation level detector known as a dosimeter, which indicates the accumulated effect of radiation over a certain time period. In contrast to the claimed invention, Gernert teaches first charging an ion chamber, and then discharging as a function of time and radiation received (*see* Gernert, col. 2, lines 15-27). Gernert is completely silent with respect to a leakage current signal as required by the claimed invention. Further, it would be clear to one skilled in the art that as Gernert teaches detecting radiation over a time period after a voltage charge is applied to an ion chamber, Gernert does not teach measuring an ion current signal related to ion currents induced by the voltage pulse while the voltage pulse is being applied to the electrodes, as required by the claimed invention.

In view of the above, Gernert fails to show or suggest the invention as recited in amended independent claim 1. Thus, amended independent claim 1 is patentable over Gernert. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection(s) under 35 U.S.C. § 103

Claims 3, 5, and 9 are rejected under 35 U.S.C. § 103(a) as being obvious over Todt in view of U.S. Patent No. 6,353,324 issued to Uber (hereinafter “Uber”). Independent claim 3 has been cancelled in this reply and incorporated into independent claim 1. Thus, this rejection is now moot with respect to claim 3. Claims 5 and 9 have been amended in this reply

as described above. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

As discussed above, one or more embodiments of the invention are directed to a method for measuring high-energy radiation. Amended independent claim 1 requires measuring an ion current signal related to ion currents induced by the voltage pulse while the voltage pulse is being applied to the electrodes, and measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped. Further, amended independent claim 1 requires determining a magnitude of the high-energy radiation flux dependent on the ion current signal and the leakage current signal.

As discussed above, Todt does not show or suggest the above limitations of the claimed invention. Uber, like Todt, does not show or suggest at least the above limitations of the claimed invention. Further, Uber fails to show or suggest at least that which Todt lacks. The Examiner asserts that Uber discloses methods for compensating ion chambers including subtracting leakage currents, and that it would have been obvious to one skilled in the art to utilize the teachings of Uber to measure the leakage current signal after the voltage pulse is turned off (*see* Office Action dated June 7, 2006, at page 9).

However, in contrast to the Examiner's assertion, it would be clear to one skilled in the art that Uber fails to disclose at least measuring a leakage current signal after the voltage pulse has been turned off and after ion transport has stopped, and determining a magnitude of the high-energy radiation flux dependent on the ion current signal and the leakage current signal, as required by the claimed invention. In contrast to the claimed invention, Uber is directed to methods for reducing leakage in an ion chamber circuit. Uber discloses, for example, circuits for analog current subtraction to compensate for leakage current in Figures 11 and 12 of Uber. However, Uber is completely silent with respect to measuring a leakage current signal after the

voltage pulse has been turned off and after ion transport has stopped. Thus, Uber is necessarily silent with respect to determining a magnitude of the high-energy radiation flux dependent on the ion current signal and the leakage current signal as required by the claimed invention.

In view of the above, Todt and Uber, whether taken separately or in combination, fail to show or suggest the invention as recited in amended independent claim 1. Thus, amended independent claim 1 is patentable over Todt and Uber. Claims 5 and 9, directly or indirectly dependent from claim 1, are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Double Patenting Rejection

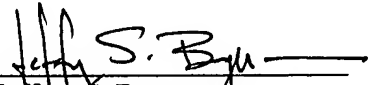
Claims 1, 4, and 9-12 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 4-8 of copending U.S. Patent Application No. 11/049,360. A terminal disclaimer in compliance with 37 C.F.R. 1.321(c) has been submitted herewith, as suggested by the Examiner. Thus, this rejection is now moot with respect to claims 1, 4, and 9-12. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 07754/046001).

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Respectfully submitted,

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Attachment: Replacement Drawing (1 Figure, 1 sheet)